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Ricardo Filipe Teixeira Barbosa

The use of shotguns in violent deaths in the northern Portugal, 2005 - 2010

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FMUP FACULDADE DE MEDICINA UNIVERSIDADE DO PORTO
UNIDADE CURRICULAR
PROJETO DE OPÇÃO
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The use of shotguns in violent deaths in the northern Portugal, 2005 - 2010

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Abstract

Shotguns are used in a significant number of homicides and suicides. For cultural reasons these weapons are very common in Portugal. The main objective of this work is to improve the knowledge about the forensic aspects of all cases involving shotguns.

We conducted a retrospective study by analyzing all forensic autopsy reports involving the use of shotguns performed between January 1st 2005 and December 31st 2010, at the Northern Services of the National Institute of Legal Medicine and Forensic Sciences (n=105).

We evaluate 105 cases, with 54 (51.4%) homicides, 41 (39.0%) suicides and 10 (9.5%) accidents. Fifty-eight percent of them were male and 66.7% occurred in rural areas. Suicides occurred at home in 90.2%, while 48.1% of homicides and 66.7% of accidents occurred in public places. Homicides were caused by problems in the marital relationship in 32.1%; 25.0% of suicides by psychiatric diseases and 40.0% of accidents by mishandling of the gun. “Near contact” (78.9%) was the most common firing distance in suicides and the head (75.6%) was the most common location of the entry wound. For homicides, the most common firing distance was distant (59.1%), and the most prevalent distributions of entry wounds were head, chest (29.6% each), and multiple wound locations (37.0%).

Violent deaths caused by shotguns were not so scarce. The knowledge of this information can induce a change in mentalities to a more restrictive law that could reduce the number of violent deaths by firearms.

Keywords: firearms, shotguns, violent deaths, forensic autopsy

Introduction

The use of firearms in violent deaths has been increasing worldwide and it is estimated that hundreds of thousands of people die annually [1]. In addition to fatalities, many more suffer non-fatal injuries, with serious physical and psychological consequences [1]. These cases constitute a major public health problem in many countries [2]. In the USA, in 2009, about 50% of all violent deaths, concerning 8200 cases, were due to the use of firearms [3]. In Portugal, according to statistics from the Ministry of Justice, the use of firearms was involved in 1311 crimes, between 2005 and 2010 [4].

People with guns at home, regardless the type of weapon, have a significantly higher risk of committing homicide and suicide by firearms than people without it [5]. In Portugal, with a population around 10,500 million people, it is estimated that there are around 2.6 million firearms [6], with an estimated value of 25 guns per 100 inhabitants, i.e. a quarter of the Portuguese population [6,7]. It is anticipated that about half of these guns are illegal [7].

In the international literature there are several studies that seek to analyze and characterize the cases of violent deaths caused by firearms [8-15]. However, these studies perform a general analysis of weapons and there are few specific studies to each type of gun, usually shotguns [13,16]. These weapons are, in some countries, the method of choice used in violent deaths, as is the case of Australia, United Kingdom and Scandinavian countries [9].

A shotgun is a weapon that is intended to be fired from the shoulder; it has a smooth bore and is designed to fire multiple pellets from the barrel [17]. Several factors justify the use of shotguns such as geographical aspects, socio-cultural and legal norms of the country in question [9,16]. In USA, the total number of deaths caused by shotguns has been declining in recent years, mainly through the reduction of homicide cases [13]. Males are the main victims of these weapons [13]. Its use in suicides is uncommon and it appears to be more related to rural areas [2]. Contrary to suicide and homicide cases, its involvement in accidents generally exceeds the use of handguns, in which hunting and mishandling of the firearm are the main causes to justify these accidents [8,16].

For historical and cultural reasons shotguns emerge as a very common practice in Portugal [6]. This fact may be related to its easiest legal acquisition to practice sport or hunting [6]. Prevention associated with behavior changes as well as changes to current national norms are keys to reduce deaths from firearms [18].

Given this reality, the main objective of this work is to promote knowledge about the forensic aspects of all cases involving shotguns. Specific aims are to characterize the use of shotguns in violent deaths that occurred in the northern region of Portugal and compare their relative frequency of use with the different manners of death (homicide, suicide or accident). According to our knowledge it is the first time that this kind of study is performed in Portugal.

Materials and Methods

We conducted a retrospective study by analyzing all forensic autopsy reports involving the use of shotguns performed between January 1st 2005 and December 31st 2010, at the Northern Services of the National Institute of Legal Medicine and Forensic Sciences (n=105).

The database was constructed and statistical analysis performed on "SPSS - Social Package for Social Sciences v20.0". The variables were analyzed comparing the cases of alleged homicide, suicide and accident according to social and demographic characteristics of the victims, knowledge of the circumstances preceding death and forensic findings. *p* values of < 0,05 were considered statistically significant.

Results

1. Global Analysis

Shotguns were used in 105 violent deaths in the northern Portugal. According to forensic autopsy reports, the use of shotguns was found in 51.4% (*n* = 54) of alleged homicides, 39.0% (*n* = 41) of suicides and 9.5% (*n* = 10) of accidents.

1.1 Victims' characterization

Of 105 cases analyzed, 81.0% (*n* = 85) of the victims were male and 19.0% (*n* = 20) were female. Most victims lived in rural areas (66.7%, *n* = 70). The age range was 16–82 years-old with a homogeneous distribution between groups starting from age 25yo. Most of the victims were married (*n* = 66; 63.5%) and employed (*n* = 46, 43.8%) (see table 1). The current or previous occupation was known in 64 cases: farmer (*n* = 16, 25.0%) and trader (*n* = 10, 15.6%) were the most frequent. Only 3 victims were in occupation which enabled access to firearms (military, police officer and security).

Information regarding the history of diseases had been noted in 45 victims (57.7%) in a total of 78 cases in which we had access to the information. Cardiovascular system diseases were more frequent (46.7%, *n* = 21), followed by the psychiatric diseases (31.1%, *n* = 14).

The information about alcohol consumption was obtained in 74 cases: 42 (56.8%) were current consumers at the time of death and 30 (40.5%) had no history of alcohol consumption.

1.2 Characterization of the event

Table 2 shows the division of cases according to the year of study. It is noted that the number of cases is very similar throughout the years and it was not possible to evaluate a trend in the use of these weapons over time. October (*n* = 16, 15.2%), August (*n* = 14, 13.3%) and December (*n* = 11, 10.5%) were the months with more cases reported.

Most cases occurred at home (*n* = 66; 56.7%) or in a public place (*n* = 20; 34.6%) (see table 3). Medical intervention occurred in only 16 cases (15.2%) and of these 12 (75.0%) had a lifetime of less than 24 hours and 4 survived more than 24 hours (25.0%).

1.3. Forensic findings

The main forensic medical findings are resumed in table 4. The number of entrance wounds was established in 94 cases and in the remaining 11 cases the gunshot caused a slough of the tissue, which prevented the entrance wound characterization.

Fatal wounds were observed most in the head and/or neck in 50 cases (47.6%) or in the chest in 22 cases (21.0%); 20 cases had fatal wounds in multiple locations (37.0%).

The toxicological study was performed in 84 cases (80.0%) and toxicological tests were positive for ethanol (0.13–3.45 g/L) in 29 of those cases (34.5%). The presence of therapeutic drugs in the blood was detected in 3 cases, but all cases had concentrations of drugs in therapeutic ranges.

2. Analysis according to the manner of death

2.1 Victims' characterization

Table 5 shows the main social and demographic characteristics of the victims according to the manner of death. Victims were male in all accidents, and in suicides we have only recorded one female victim aged 37. This difference was smaller in homicides (men 64.8%, women 35.2%).

Homicides and suicides occurred more in adults, the group [25-64yo] had 72.2% and 65.9% of cases, respectively. In accidents, 40.0% (n = 4) of the victims are in the group of [15-24yo], which corresponds to 80.0% of all cases occurring in this age group.

In suicides and accidents, farmer was the main occupation found, but note that accidents occurred in 3 students (30.0%). In homicides housewife was the occupation recorded in 20.6% (n = 6) of cases, which corresponds to 66.6% of women in which the current or previous occupation was known.

Psychiatric diseases had been noted in 13 cases (31.7%) of all suicides, which correspond to 92.9% of all victims with psychiatric diseases. Depression was the main problem found.

2.2 Characterization of the event

If we analyze separately, June (n = 7, 17.1%) was the month in which there were more suicides, homicides occurred more in August (n = 10, 18.5%) and October (n = 5, 50.0%) was the month in which there were more accidents. The distribution according to different years of study was uniform.

We emphasize that almost all suicides occurred at home (n = 35, 90.2%), while homicides and accidents occurred mainly in public places (n = 26, 48.1% and n = 6, 66.7%, respectively) (see table 6).

According to the manner of death the table 7 shows motives/precipitating factors that have led to the event. In homicides, the problems in the marital relationship (n = 9, 32.1%), discussions with neighbors (n = 7, 25.0%) and robberies (n = 6, 21.4%) were the main causes found. In suicides, psychiatric diseases (n = 5, 25.0%) and life-threatening illness (n = 4, 9.8%) emerged as the main reasons. With regard to accidents, they occurred mostly by mishandling of the gun (n = 6, 60.0%) and hunting accidents (n = 3, 30.0%).

2.3. Forensic findings

Table 8 shows the main forensic findings according to the manner of death. One entrance wound was founded in all suicides. Head and/or neck (n = 31, 75.6%) were the most common anatomical regions, followed by chest and abdomen with 5 cases each (12.2%). In this situation the firing distance was known in 19 cases (46.3%): 15 (78.9%) were at “near contact” and 4 (21.1%) in contact.

With regard to homicides in 26 cases (48.1%) multiple entrance wounds (4 or more) were observed and in 22 cases (40.7%) the presence of only one entrance wound was reported. When only one anatomical region was involved head and/or neck and chest were the most affected with 16 cases each (29.6%). Note that in homicides the simultaneous achievement of various anatomical regions was common, occurring in 20 cases (37.0%). Information about the firing distance was available in 38 cases and in 26 cases (59.1%) the gunshot was made at "distance".

In accidents one entrance wound was achieved in 6 cases (60.0%), being the abdomen the main region involved (n = 4, 40.0%), closely followed by head and/or neck with 3 cases (30.0%). Fifty percent of gunshots occurred at "near contact". In both homicides and accidents were not recorded shots in contact.

Using the Chi-Square Test, it was possible to observe that the location of entrance wounds and firing distance were associated with the manner of death ($p = 0.001$).

In the toxicological study, the presence of alcohol was positive in 19 cases of homicides with concentrations ranging from 0.13g/L to 2.57g/L, while in suicides concentrations ranged from 0.67g/L to 3.45g/L, in six positive cases.

Discussion

Shotguns are used in a significant number of homicides and suicides, however, in literature the characterization of cases where this type of weapon is used is rare [13].

Between 2005 and 2010 the total number of deaths involving shotguns was similar in northern Portugal, with no pattern of evolution. In this period 105 cases were recorded in the northern region of Portugal (0.46/100000 inhabitants in north region, in 2010).

Of these cases, 51.4% (n = 54) were homicides, 39.0% (n = 41) suicides and 9.5% (n = 10) accidents. In USA, a study showed the use of shotguns in 46.5% homicides, 52.4% suicides and 0.7% accidents [13]. Singh et al [16] reported 39.0% of homicides, 3% of suicides and 19% of accidents in a region of India. These results clearly show a variability in the use of this weapon depending on geographical aspects, legal rules and traditions of each country [9,16].

The use of firearms in violent deaths is associated predominantly with males, being men the main victims of shotguns [13]. In our study this pattern was observed, with 81.0% of male victims. This difference was smaller in the case of homicides with 35.2% of female victims. With regard to suicide cases, which are more fully described in the literature, in our study we obtained a ratio of male to female 40 (40/1), much higher compared to other studies [2]. This difference is explained by the existence of cultural patterns that associate men with more violent deaths [19]. In addition, men have higher suicidal tendencies, greater familiarity with the method and less concern with the disfiguration caused by the weapon, unlike women who seek to avoid methods that alter body image [19]. According to Kohlmeier et al [20], the handgun was the most common firearm chosen to commit suicide by females.

Our data shows no differences in the distribution of cases by age starting from age 25yo. Homicides with firearms tend to occur more in adults, being less frequent in young people and the elderly [14]. In our study the victims were mainly adults, the group [25-64yo] had 72.2% of cases. Miller et al

[21] revealed that in USA, most attempts of suicide occurred among people aged 15-24yo, but deaths were more frequent in adults older than 24 years. In our study there was only one case under 25 years, which shows that the use of these guns by young people is rare in Portugal. The same was found in homicides.

In accidents all victims were men. This predominance was also found in studies from others countries like USA, Denmark and Sweden [8]. Death in such cases occurs more often in young people, aged between [15-24yo] [8]. In our study the highest number of cases occurred with victims under 25 years old (40.0%) and two of these cases occurred when youths were playing with guns. This arouses attention to the need for greater caution of caregivers in accessing children/young people to arms, whether they are loaded or not [8].

The studies support the hypothesis that the use of shotguns in suicides, homicides and accidents is higher in rural areas compared to urban areas [18]. The data collected in our study regarding the victims' residence indicated greater proportion of victims in rural areas (66.7%). In these regions this type of weapon is easily acquired [16] and is traditionally transmitted between generations in the family [6], founding them in many houses hanged on the walls [16].

Farming was the main occupation (25.0%). This finding is consistent with data from other study [16]. It is known that this occupation has a high risk of suicide with firearms [21]. However, both the percentage of fatalities in rural areas as their occupation with agriculture may be undervalued. This could result from a decrease of inhabitants in rural areas where it is more frequent and also by the lack of information about the occupations in some cases, in particular previous occupations of retirees (36.6%).

Although cardiovascular diseases constitute the main pathology found on the victims, it is important to highlight the high number of suicides in which victims have diagnosed psychiatric disorders (47.8%). While there is no unanimity in the association between history of psychiatric illness and suicide, according to Cavanagh et al [22], psychiatric disease, especially diseases of humor, is present in 90% of victims who commit suicide.

The investigation of the motive/scenario is an essential component when analyzing violent deaths [23]. In homicides the problems in marital relationship (32.1%), discussions with neighbors (25.0%) and robberies (21.4%) were the main causes. These situations reflect the easy accessibility to obtain this type of weapon and its presence at home, making it a great tool to solve individuals' problems in a violent manner.

The data collected showed that in the case of suicides psychiatric diseases was the precipitating factor in 25.0% of cases. This shows that despite their diagnosis and respective treatment, it may not be effective or not fulfilled, so in these cases access to firearms should be actively restricted and the physician perform an important role in prevention [17]. It is also important to note that the presence of other disorders was found in 20% of cases. This scenario alert to the fact that physicians have also an important role in this type of situation [22]. They should understand how each individual reacts to disease, because even if their life may not be at risk, other factors such as loss of independence may be important triggers of this act [22].

With regard to accidents, shotguns are the type of weapons more susceptible to carelessness in handling and are used more often in risky situations, such as hunting [8]. In our study, the accidents

occurred mainly by the mishandling of the gun (40.0%) and hunting accidents (30.0%), which are the motives most frequently reported in other studies [8,16]

There is scientific evidence that indicates that people who consume alcohol or illicit drugs have an increased risk of committing acts of violence to others or to themselves, however, alcohol abuse is more strongly associated with violent deaths than illegal drugs [24]. In our study, regular consumption of alcohol was found in 53.6% of cases. This shows that the carrying of firearms by these individuals should be limited, having families and the physician an important role [25].

The severity and lethality of shotgun wounds depends on the number of pellets that enter the body, the organ hit by the pellets and the amount of tissue destroyed [16]. This fact is supported in our study because medical intervention occurred in only 16 cases (15.2%), showing that this weapon is very lethal.

Shotgun wounds are different depending on the type of pellets used, the distance of the shot and the region affected [26]. In accordance to other studies [13,16], our data showed that the most affected sites were head and/or neck (75.6%), followed by the chest (12.2%) and abdomen (12.2%).

Molina et al [13] revealed that the achievement of regions that host important organs such as the head and chest and even multiple locations occur more often in homicides, but there is no significant statistically evidence of a preferential anatomic site. Our study showed that entrance wounds were located on the head and/or neck and chest in 29.6%, and the involvement of various anatomical regions simultaneously occurred in 37.0% of cases. In suicides with firearm the head is generally the involved site [10]. In our study, most suicides were accomplished by shots fired in the head and/or neck (75.6%), which was consistent with previous studies [2,13]. In accidents, unlike other studies [8,16], the abdomen was the most affected site, followed by the head. However, in these cases there are no anatomical regions preferred and the firing distance is variable also too [13,16].

In shooting at short distances, the shotgun is the most tremendous and destructive of small guns [17]. The distance determination of the shots is performed by evaluating the presence or absence of the residues that leave the firing barrel [27]. In gunshots made at contact, these elements penetrate the wound [27]. In “near contact” and intermediate distance there is a deposition of discharge residues around the orifice or directly on clothing that are covering the impact area [27]. As the muzzle of the shotgun is moved farther from the body, tattooing disappears and the diameter of the circular wound of entrance increases in size and individual pellet holes may appear [17].

In homicides the most common firing distance was distant [13]. Our data showed the same results. In suicides “near contact” wounds were the most common , which can be explain by the absence of a device to pull the trigger, that is necessary to achieve longer shooting distances [15]. It was demonstrated a relationship between the location of entrance wounds and firing distance with the manner of death ($p = 0.001$).

In the toxicology study, analysis of blood alcohol was performed more times, followed by analysis of illegal drugs and therapeutic drugs. In our study we revealed that 26.8% of the victims where a toxicological study was performed had alcohol in their blood. Karger et al [9] revealed that the blood alcohol analysis may be useful in establishing the manner of death, because the homicide victims had blood alcohol less frequently than the suicide victims. Our data showed that in homicides 19 cases were

positive, the concentration ranged from 0.13g/L to 2.57g/L, while in suicides concentration ranged from 0.67g/L to 3.45g/L, in six positive cases. It is known that men have a higher probability of being intoxicated before committing suicide [28].

Limitations

The analysis of some variables were limited due to the retrospective nature of the study, therefore it was not possible to collect all data. Some information collected is based on social surveys, which does not allow us to have full credibility on the data and, moreover, in many cases there is no information at all.

Conclusion

The determination of the manner of death (suicide, homicide or accidents) is one of the main objectives of the Forensic Medicine. The studies that seek to analyze series of cases are an important way to understand and find common denominators in each situation, leading forensic science to a preventive attitude of violent deaths.

There are many variables that contribute in a significant way for this diagnosis: investigation of the death scene and the circumstances preceding the death, victims´ characteristics, gun characterization (type, number of shots and shooting distance) and the location of the entrance wound.

Information about the use of shotguns is scarce in the literature however, due to a significant use of these weapons in violent deaths and also a significant presence in the homes of Portuguese people, it is important to obtain a characterization of their use.

In our study, the use of shotguns occurred in 105 cases, which shows that despite restrictive laws in Portugal the use of these weapons is not so scarce. Our data shows that its use is predominant in homicides and suicides and men are the main victims. They are used mainly in rural areas and by farmers. Young people seem to assume a significant role in accidents.

The head and/or neck were the most involved regions however, there are variations depending on the manner of death that can help to point it out. Firing distance seems to have a similar role.

The motives are also closely related to the manner of death: in homicides, marital discussions or with neighbors were the main causes; in suicides diseases are the precipitating reasons found in more cases and in accidents we have mishandling of the gun and hunting accidents.

Therefore, it is important to understand the real existence of these weapons, because knowing this information can induce a change in mentalities to a more restrictive law that could reduce the number of violent deaths by firearms.

Integrity of research and reporting

Ethical standards

The authors developed a retrospective study and were not carried out any intervention.

Conflict of interest

The authors declare that they have no conflict of interest.

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Tables

Table 1 – Social and demographic characteristics of the victims.

		n	%	Total n (%)
Gender	Male	85	81.0	
	Female	20	19.0	105 (100)
Age	[15-24yo]	6	5.7	
	[25-34yo]	17	16.2	
	[35-44yo]	15	14.3	
	[45-54yo]	18	17.1	
	[55-64yo]	21	20.0	
	[65-74yo]	10	9.5	
	[+75yo]	18	17.1	105 (100.0)
Marital Status	Married	66	63.5	
	Single	20	19.2	
	Divorced	13	12.5	
	Widowed	5	4.8	104 (99.0)
Job	Employed	46	50.0	
	Retired	34	37.0	
	Unemployed	12	13.0	92 (87.6)
Residence	Rural	70	66.7	
	Urban	35	33.3	105 (100.0)

Table 2 – Distribution of cases over the 6-years.

		n	%	Total n (%)
Year	2005	21	20.0	
	2006	15	14.3	
	2007	15	14.3	
	2008	18	17.1	
	2009	21	20.0	
	2010	15	14.3	105 (100.0)

Table 3 – Place of death

	n	%	Total n (%)
Home	59	56.7	
Public Place	36	34.6	
Work's Place	5	4.8	
Neighbors' house	3	2.9	
Families house	1	1.0	104 (99.0)

Table 4 – Forensic findings

		n	%	Total n (%)
Entrance wound location	Head + Neck	50	47.6	
	Chest	22	21.0	
	Abdomen	10	9.5	
	Back	2	1.9	
	Limbs	-	-	
	Multiple wound locations	20	37.0	105 (100.0)
Firing distance	Contact	4	3.8	
	"Near Contact"	28	26.7	
	Intermediate distance	11	10.5	
	Distant	29	27.6	72 (68.6)

Table 5 – Social and demographic characteristics of the victims according to the manner of death

		Suicide (n,%)		Homicide (n,%)		Accident (n,%)	
Gender	Male	40	97.6	35	64.8	10	100.0
	Female	1	2.4	19	35.2	-	-
	Total	41	100.0	54	100.0	10	100.0
Age	[15-24yo]	1	2.4	1	1.9	4	40.0
	[25-34yo]	5	12.2	12	22.2	1	10.0
	[35-44yo]	7	17.1	8	14.8	-	-
	[45-54yo]	5	12.2	12	22.2	1	10.0
	[55-64yo]	10	24.4	7	13.0	3	30.0
	[65-74yo]	5	12.2	5	9.3	-	-
	[+75yo]	8	19.5	9	16.7	1	10.0
	Total	41	100.0	54	100.0	10	100.0
Marital Status	Married	29	70.7	30	56.6	7	70.0
	Single	5	12.2	12	22.6	3	30.0
	Divorced	5	12.2	8	15.1	-	-
	Widowed	2	4.9	3	5.7	-	-
	Total	41	100.0	54	100.0	10	100.0
Job	Employed	16	44.4	22	47.8	8	80.0
	Retired	17	47.2	15	32.6	2	20.0
	Unemployed	3	8.3	9	19.6	-	-
	Total	36	100.0	46	100.0	10	100.0
Residence	Rural	27	65.9	36	66.7	7	70.0
	Urban	14	34.1	18	33.3	3	30.0
	Total	41	100.0	54	100.0	10	100.0

Table 6 – Place of event according to the manner of death.

	Suicide (n,%)		Homicide (n,%)		Accident (n,%)	
Home	37	90.2	20	37.0	3	30.0
Public Place	4	9.8	26	48.1	6	60.0
Work's Place	-	-	5	9.3	-	-
Neighbors' house	-	-	3	5.6	-	-
Families house	-	-	-	-	1	10.0

Table 7 – Life events in relation to the manner of death.

		n	%	Total (n, %)
Suicide	Psychiatric disease	5	29.5	
	Life-threatening illness	4	23.5	
	Job problem	3	17.6	
	Problems in the marital relationship	2	11.8	
	Terminal illness	1	5.9	
	Financial problem	1	5.9	
	Recent death of relative	1	5.9	17 (41.5)
Homicide	Problems in the marital relationship	9	34.6	
	Discussion with neighbor	7	26.9	
	Robbery	6	23.1	
	Job problem	2	7.7	
	Discussion with family member	2	7.7	26 (48.1)
Accident	Mishandling of the gun	4	40.0	
	Hunting accident	3	30.0	
	Playing with gun	2	20.0	
	Drop with gun	1	10.0	10 (100.0)

Table 8 – Forensic findings related to the manner of death.

		Suicide (n,%)		Homicide (n,%)		Accident (n,%)	
Number	1	33	80.5	22	40.7	5	50.0
entrance	2	-	-	4	7.4	1	10.0
wounds	3	-	-	1	1.9	-	-

	Multiple	-	-	26	48.1	2	20.0
	Undetermined	8	19.5	1	1.9	2	20.0
	Total	41	100.0	54	100.0	10	100.0
Location	Head + Neck	31	75,6	16	29,6	3	30,0
	Chest	5	12,2	16	29,6	1	10,0
	Abdomen	5	12,2	1	1,9	4	40,0
	Back	-	-	1	1,9	1	10,0
	Limbs	-	-	-	-	-	-
	Multiple wound locations	-	-	20	37,0	1	10,0
	Total	41	100.0	54	100.0	10	100.0
Firing distance	Contact	4	21.1	-	-	-	-
	Near Contact	15	78.9	8	18.2	5	55.6
	Intermediate distance	-	-	10	22.7	1	11.1
	Distant	-	-	26	59.1	3	33.3
	Total	19	100.0	44	100.0	9	100.0

Annexes

Annex 1: Instructions for Authors

GUIDELINES FOR PUBLISHING POPULATION DATA

In 1997 Prof. Bernd Brinkmann formulated guidelines for the submission of manuscripts on short tandem repeat (STR) population data (Brinkmann 1997). These earlier guidelines have now been extended to include haploid DNA markers, i.e. mitochondrial DNA (mtDNA) and Y-chromosomal polymorphisms.
For specific information, see the Short Communication "Publication of population data of linearly inherited DNA markers in the International Journal of Legal Medicine" (Parson and Roewer 2010; DOI 10.1007/s00414- 010-0492-y) published online in Int J Legal Med in July 2010.
All forensic population genetics papers should always contain information on the description of the population, ethical requirements and quality control. For mtDNA papers, previous acceptance of the dataset in EMPOP is required; for YSTR and YSNP data, previous inclusion of the data in the YSTR/YSNP database is required.

- EMPOP database
- YSTR/YSNP database

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- Save your file in doc format. Do not submit docx files.
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LaTeX macro package (zip, 182 kB)

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  Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. N Engl J Med 965:325–329

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- Book chapter

  Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257

- Online document

  Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. http://physicsweb.org/articles/news/11/6/16/1. Accessed 26 June 2007

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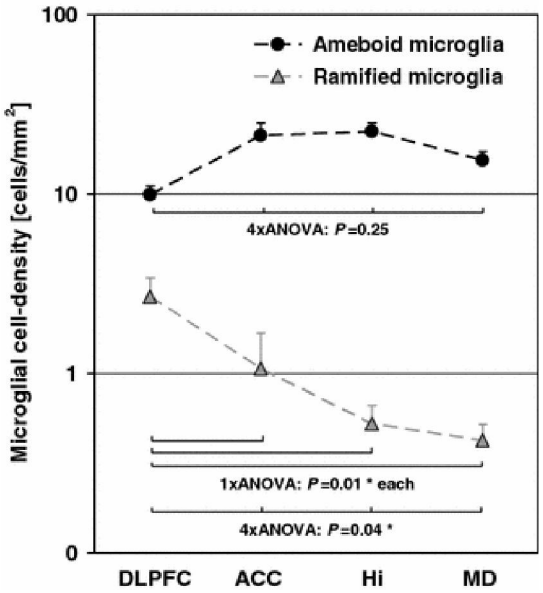

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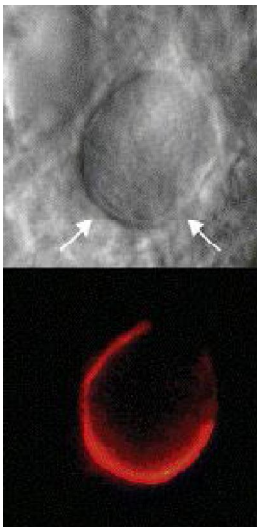

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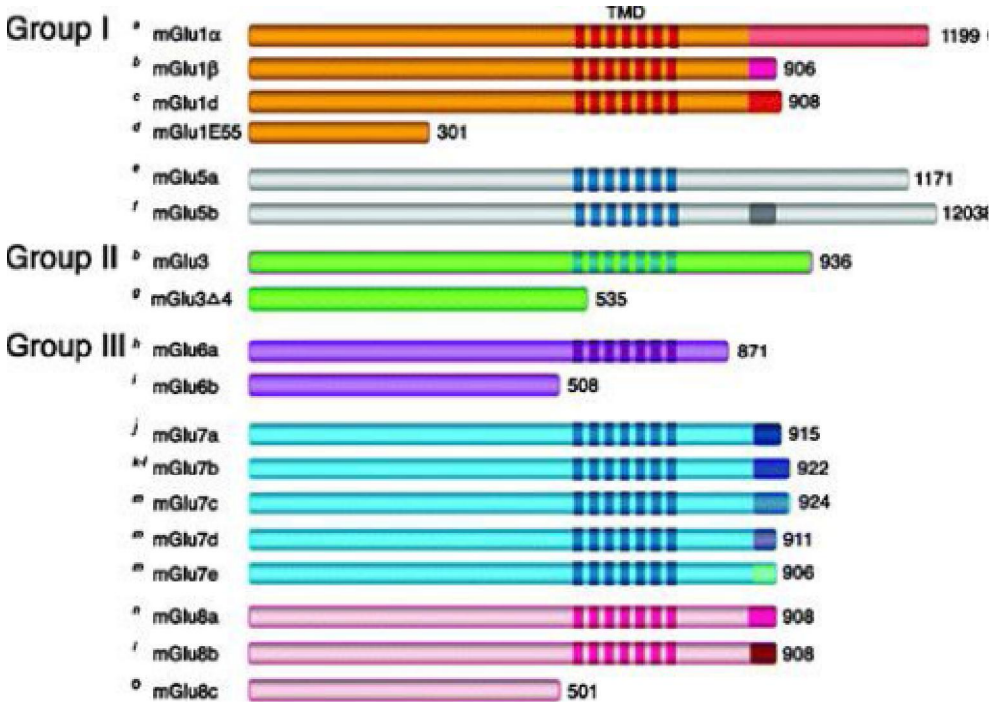

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